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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/727,038	11/30/2000	Tinku Acharya	INTL-0512-US (P10263)	2991
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Timothy N. Trop TROP, PRUNER & HU, P.C. 8554 KATY FWY, STE 100 HOUSTON, TX 77024-1805				
EXAMINER HENN, TIMOTHY J				
ART UNIT 2612		PAPER NUMBER		

DATE MAILED: 11/18/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/727,038

Applicant(s)

ACHARYA ET AL.

Examiner

Timothy J Henn

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 21 September 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-3,5-10,18-20 and 22-27 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-3,5,6,18-20 and 22-27 is/are rejected.
- 7) ☒ Claim(s) 7-10 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 30 November 2000 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Response to Arguments

1. Applicant's arguments with respect to claims 1-3, 5-10 and 18-20 have been considered but are moot in view of the new ground(s) of rejection.
2. In the amendment received on 21 September 2004 the applicant argues that Hel-or does not disclose averaging neighboring pixel values to obtain an interpolated value, and instead discloses the use of a weighted sum. However, in the case of a smooth zone (i.e. a dominant orientation vector of 0), the formula used by Hel-or:

$$I(i, j) = \frac{W(k, l)I(k, l)}{\sum_{(k,l) \in N(i,j)} W(k, l)}$$

becomes a traditional average. In Hel-or the weighting function is defined as

$$W(k, l) = (1 + D(i, j) \cdot V(i, j, k, l))$$

where $D(i, j)$ is the dominant orientation vector and $V(i, j, k, l)$ is the unit vector pointing from the center pixel to the neighboring pixels. In the case of a smooth zone, $D(i, j) = 0$ and the dot product of $D(i, j)$ with the unit vectors of the neighboring pixels is equal to 0. Therefore, the weights for each summed pixel are equal to 1 and the interpolated pixel becomes the average of the neighboring pixels as claimed.

Claim Rejections - 35 USC § 102

3. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.
4. Claims 1-3, 18-20 and 22-25 are rejected under 35 U.S.C. 102(b) as being anticipated by Cok (US 4,642,678).

[claim 1]

In regard to claim 1, Cok discloses a method comprising: estimating a plurality of interpolated first color values (e.g. green) from a plurality of first color values in a sub-block of image data using first color values from four direct neighbors in the sub-block to estimate an interpolated first color value (c. 6, ll. 50-61), wherein the image data comprises first color values (e.g. green), second color values (e.g. red) and third color values (e.g. blue) (Figure 6; c. 6, ll. 42-49); deriving a plurality of second color hues (e.g. R_1/G_1 , R_3/G_3 ; Equation 17) using the second color values (e.g. R_1 , R_3) and the interpolated first color values (e.g. G_1 , G_3); and estimating a plurality of interpolated second color hues using the second color hues (e.g. Figure 3).

[claim 2]

In regard to claim 2, Cok discloses deriving a second plurality of second color values from the plurality of interpolated second color hues (e.g. Figure 3, Items R' , B' ; Equations 17, 18 and 19).

[claim 3]

In regard to claim 3, Cok discloses interpolating third color values (e.g. blue) in the same manner as second color values (e.g. red) (c. 7, ll. 30-32).

[claim 18]

In regard to claim 18, Cok discloses an article comprising a medium storing a software program (c. 3, ll. 42-60) that if executed enable a processor-based system to: estimate a plurality of interpolated first color values (e.g. green) from a plurality of first color values in a sub-block of image data using first color values from four direct neighbors in the sub-block to estimate an interpolated first color value (c. 6, ll. 50-61), wherein the image data comprises first color values (e.g. green), second color values (e.g. red) and third color values (e.g. blue) (Figure 6; c. 6, ll. 42-49); derive a plurality of second color hues (e.g. R_1/G_1 , R_3/G_3 ; Equation 17) using the second color values (e.g. R_1 , R_3) and the interpolated first color values (e.g. G_1 , G_3); and estimate a plurality of interpolated second color hues using the second color hues (e.g. Figure 3).

[claim 19]

In regard to claim 19, Cok discloses an article comprising a medium storing a software program (c. 3, ll. 42-60) that if executed enable a processor-based system to: derive a second plurality of second color values from the plurality of interpolated second color hues (e.g. Figure 3, Items R' , B' ; Equations 17, 18 and 19).

[claim 20]

In regard to claim 20, Cok discloses an article comprising a medium storing a software program (c. 3, ll. 42-60) that if executed enable a processor-based system to: interpolate third color values (e.g. blue) in the same manner as second color values

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(e.g. red) (c. 7, ll. 30-32).

[claim 22]

In regard to claim 22, Cok discloses a plurality of first color values comprising logarithmic values (e.g. calculations performed in density space; Equations 20, 21 and 22).

[claim 23]

In regard to claim 23, Cok discloses a method comprising obtaining first color values (e.g. green) for a plurality of pixels of an array, the array having first color filters (e.g. green), second color filters (e.g. red) and third color filters (e.g. blue) (Figure 6; c. 6, ll. 42-49); and interpolating a first color value for a pixel not having the first color filter in a horizontal direction and a vertical direction of the array (i.e. bilinear interpolation; c. 6, ll. 50-61).

[claim 24]

In regard to claim 24, Cok discloses a method wherein the pixel shaving the first color filter comprise four neighboring pixels to the pixel not having the first color filter (Figure 6, note red and blue pixels surrounded by four green pixels).

[claim 25]

In regard to claim 25, Cok discloses first color values comprising logarithmic values (e.g. calculations performed in density space; Equations 20, 21 and 22).

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5. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

6. Claims 5 and 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cok (US 4,642,678) in view of Hel-or et al. (US 6,404,918).

[claim 5]

In regard to claim 5, Cok discloses all limitations determining that the sub-block is a smooth zone. However, it is known in the art to detect smooth and non-smooth zones and to interpolate using different methods accordingly, see for example Hel-or et al. (hereinafter referred to as Hel-or) (c. 4, 11. 4-15). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to interpolate based upon a detection result of a smooth/non-smooth zone as taught by Hel-or to correctly interpolate image data without generating color artifacts along edges (c. 3, 11. 4 1-53).

[claim 6]

In regard to claim 6, note that Hel-or classifies an area as a smooth zone when the dominant orientation vector zero (i.e. the neighboring pixels are substantially similar; c. 4, 11. 4-15).

7. Claims 26 and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cok (US 4,642,678) in view of Cok (US 4,630,307).

[claim 26]

In regard to claim 26, Cok '678 discloses all limitations except for interpolating the first color value for the pixel according to one of a set of algorithms based on the

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first color values of the four neighboring pixels. However, Cok '307 discloses changing the interpolation of pixels on the basis of horizontal and vertical gradients determined from the color values of neighboring pixels (e.g. Figures 11, 12 and 13). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to choose one of a set of algorithms based on the first color values as taught by Cok '307 to interpolate signal values with reduced reconstruction errors (c. 2, ll. 5-10).

[claim 27]

In regard to claim 27, Cok '307 discloses interpolating color values according to one of a set of algorithms based on whether the pixel is within a smooth zone (c. 5, ll. 63-67), and edge zone (Figure 12) or a stripe zone (Figure 13).

Allowable Subject Matter

8. Claims 7-10 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

[claims 7 and 8]

In regard to claims 7 and 8 the prior art does not teach or fairly suggest an edge interpolation method which averages three of four pixels, multiplies the average by a predetermined value to produce a result and averages the result with the remaining pixel.

[claims 9 and 10]

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In regard to claims 9 and 10 the prior art does not teach or fairly suggest a stripe interpolation method which averages two direct neighbor pixels that are substantially similar, multiplies the average by a predetermined value to produce a first result, averages the remaining two direct neighbor pixels to produce a second result, adds the first and second results together to produce a third result and divides the third result by four.

Conclusion

9. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the mailing date of this final action.

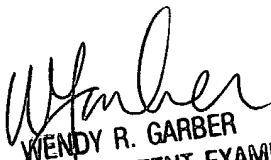
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Timothy J Henn whose telephone number is (703) 305-8327. The examiner can normally be reached on M-F 9:00 AM - 6:00 PM.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wendy R Garber can be reached on (703) 305-4929. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

TJH
11/13/2004


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